INTERIM EVALUATION OF LEVEE PERFORMANCE DATA IN CALIFORNIA
March 19, 2010

Overview

The California Department of Water Resources (DWR) is conducting an unprecedented evaluation of 2,100 miles of levees comprising the Central Valley Flood Control System under the Urban and Non-Urban Levee Evaluations (ULE/NULE) Program. This study is roughly 70 percent complete. In addition, the recently completed DWR Delta Risk Assessment Study (DRMS) has also evaluated over 600 additional miles of levees in the Delta. Both of these programs included a comprehensive data collection process. Historic performance data was collected from numerous sources including federal, state and local agencies. Collected data included reports, interview records, reconnaissance study reports, past maintenance records, maps, as-built records and relevant newspaper records. This comprehensive data collection effort resulted in a large amount of data that was electronically scanned and catalogued in a levee evaluation database. The database currently consists of over 10,000 records. This data was evaluated to understand the statistical trends in levee performance data. The following paragraphs present an interim summary of these performance records.

Levee Performance Data

The ULE/NULE database was evaluated to categorize the reported levee performance events related to seepage, stability, erosion, overtopping and levee breach. A review of data collected to date disclosed that 966 records relate to seepage, 373 relate to slope instability and subsidence, 3,677 relate to erosion, 73 records relate to overtopping and 179 records relate to levee breach. Levee performance data from DRMS outside the ULE/NULE project area included detailed records of over 150 breaches that flooded numerous Delta Islands over the years.

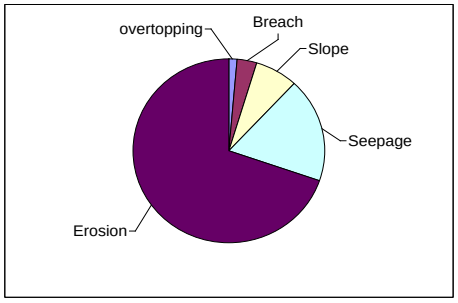

Figure 1. Levee performance records in the ULE/NULE study area

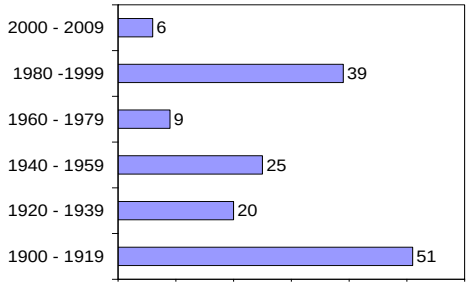

Figure 2. Breach records in the Delta and outside ULE/NULE study area

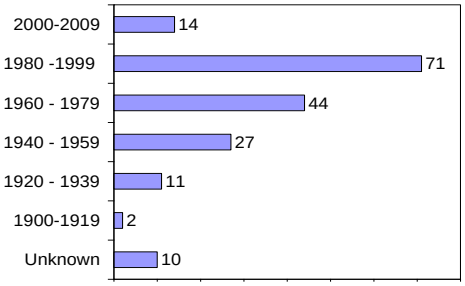

Figure 3. Breach records in the ULE/NULE study area

Many of these performance records contained additional data that discuss factors that may have caused the adverse performance. Also, over 350 miles of urban levees are being evaluated in more detail using geotechnical data obtained from field investigations. Based on the review of performance data, geotechnical analyses and literature, the primary factors that influence levee performance consisted of levee foundation characteristics, levee material, levee geometry, and hydraulic head. Additional external factors that influence levee performance consisted of animal burrows and the presence of utility penetrations.

Vegetation

Performance data was reviewed to understand the influence of vegetation on levee performance. Based on this review, vegetation did not appear to have played a role in any of the 179 records of levee breach in the Central Valley and 150 recorded breaches in the remaining Delta levees. Review of the collected data also suggests that the influence of vegetation on levee performance is negligible: out of the 5,089 records of performance issues, 8 records could be associated with levee vegetation.